

Progress Report

- 1. Organization Title:** Carnegie Mellon University
- 2. Project Title:** Climate Change and Water Availability: Evaluating and Mitigating Risks in the Electric Power Sector
- 3. Award Number:** NA14OAR4310249
- 4. Report Period:** 08/01/2014 - 04/30/2015
- 5. Introduction (a brief summary of the project):** Climate change is expected to alter extreme weather events and thus change water availability. In addition, increasing temperatures will likely result in increased demand for electricity. Power generation heavily relies on water, either for cooling or for hydropower generation. Increased temperatures, coupled with decreased water availability and increased demand for electricity will thus affect power plants operations and could affect the reliability of the power system. To date, much work has focused on the drought-prone Southwest United States and Texas. While NOAA RISAs have identified the possibility of future droughts in the Southeast United States, no rigorous high-resolution regional studies exist of climate impacts on the vulnerability of and adaptation in the power sector. This proposal seeks to improve information on the risks and opportunities that result from changes in climate and weather extremes to the Southeastern United States power sector (the Southern Electric Reliability Council, or SERC).
- 6. Purpose (the objectives of the project):** For this project we posed three questions, which we will explore in depth for the period from 2010 to 2050. First, we focus on climate, and ask how local hydrology and thus water availability will be affected by climate change and related extreme weather events. Second, we examine how these changes in climate and water availability will affect the operations of existing and future power systems. Third, we examine the costs and benefits of technically feasible climate adaptation investments in the power system.
- 7. Approach (describe the work that has been performed):** The project officially started on August 1, 2014 and since then we have recruited two PhD students to work on the project. One PhD student (Yixin Mao) is working with Dr. Bart Nijssen at the University of Washington. Yixin has started to develop the hydrological model for the Southeast U.S.
A second student at Carnegie Mellon University (Aviva Lowe) has started developing the model for power plant operations under different technologies that could help mitigate climate driven-risks.
- 8. Results (the actual accomplishments to date):** The UW team is starting with the Tennessee river basin as a sample implementation. The UW team has run the hydrological and routing models over this domain and is currently implementing the water temperature model. The team at Carnegie Mellon has developed a model to estimate the cost-effectiveness of retrofitting existing thermal power plants with dry cooling technology. The team is in the process of preparing a manuscript for submission at Environmental Science and Technology.